

Chapter 1

Router Overview

This chapter provides an overview of the T320 Internet Router, discussing the following topics:

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Router Description

The T320 Internet Router is a complete routing system that provides Gigabit Ethernet, SONET/SDH, and other high-speed interfaces for large networks and network applications, such as those supported by Internet service providers (ISPs).

Application-specific integrated circuits (ASICs) are a definitive part of the router design; these ASICs enable the router to achieve data forwarding rates that match current fiber-optic capacity.

The router accommodates up to eight Flexible PIC Concentrators (FPCs), which can each be configured with a variety of network media types—altogether providing up to 64 Gigabit Ethernet, 64 SONET/SDH OC-48/STM-16, or 16 SONET/SDH OC-192/STM-64 ports for the router.

The router's maximum aggregate throughput is 160 Gbps, full duplex. The router can forward traffic at high-performance rates for any combination of PICs that does not exceed 20 Gbps on a single FPC3. Any combination exceeding 20 Gbps is supported, but constitutes oversubscription. For information about the FPC types, see "FPC1, FPC2, and FPC3" on page 11.

The router architecture cleanly separates control operations from packet forwarding operations. This design eliminates processing and traffic bottlenecks, permitting the router to achieve high performance. Control operations in the router are performed by the host subsystem, which runs JUNOS Internet software to handle routing protocols, traffic engineering, policy, policing, monitoring, and configuration management. Forwarding operations in the router are performed by the Packet Forwarding Engines, which consist of hardware, including ASICs, designed by Juniper Networks.

Router Specifications

Table 1 lists the router's physical and environmental specifications.

Table 1: Physical and Environmental Specifications

Description	Value
Physical Specifications	
Chassis dimensions	25.13 in. (63.82 cm) high x 17.43 in. (44.3 cm) wide x 31 in. (78.7 cm) deep Total depth (including cable management system) 35.5 in. (90.2 cm)
Router weight	Chassis with midplane: 131.4 lb (59.6 kg) Minimum configuration: 272.1 lb (123.4 kg) Maximum configuration: 369.9 lb (167.8 kg)
Environmental Specifications	
Altitude	No performance degradation to 10,000 ft (3048 m)
Relative humidity	Normal operation ensured in relative humidity range of 5% to 90%, noncondensing
Temperature	Normal operation ensured in temperature range of 32°F (0°C) to 104°F (40°C)
Shock	Tested to meet Bellcore Zone 4 earthquake requirements
Thermal output	11,000 BTU/hour (3200 W)

Field-Replaceable Units (FRUs)

Field-replaceable units (FRUs) are router components that can be replaced at the customer site. Replacing FRUs requires minimal router downtime. There are three types of FRUs:

Hot-insertable and hot-removable FRUs—You can remove and replace these components without powering down the router or disrupting the routing functions.

Hot-pluggable FRUs—You can remove and replace these components without powering down the router, but the routing functions of the system are interrupted when the component is removed.

Table 2 lists the FRUs for the T320 router.

Table 2: Field-Replaceable Units

Hot-Removable and Hot-Insertable FRUs	Hot-Pluggable FRUs
Craft interface	Routing Engines
Flexible PIC Concentrators (FPCs)	Control Boards (CBs)
Physical Interface Cards (PICs)	Connector Interface Panel (CIP)
Switch Interface Boards (SIBs)	
SONET Clock Generators (SCGs)	
Power supplies	
Front and rear fan trays	
Air filters	

For FRU replacement instructions, see “Hardware Maintenance and Replacement Procedures” on page 139.

Component Redundancy

The router is designed so that no single point of failure can cause the entire system to fail. The following major hardware components are redundant:

SIBs—The router has three SIBs. Each FPC has a dedicated ASIC with five high-speed links that connect to the SIBs. Two high-speed links connect to SIB1 and SIB2. One high-speed link connects to SIB0. SIB0 acts as a backup to SIB1 and SIB2.

In the event of a complete SIB failure, SIB0 will become active. Because SIB0 has only one high-speed link to each FPC, only three links will remain active. A slight degradation in forwarding capacity may occur. When the failed SIB is replaced, it will become active and SIB0 will revert to backup. The router will regain full forwarding capacity.

Host subsystem—The host subsystem consists of a Routing Engine and a Control Board (CB) functioning together. The router can have one or two host subsystems. If two host subsystems are installed, one functions as master and the other functions as backup. If the master host subsystem (or either of its components) fails, the backup takes over as master. To operate, each host subsystem requires a Routing Engine and CB to be installed in adjacent slots.

SCGs—The router can have one or two SCGs. One functions as master and one functions as backup. If one SCG fails, the other becomes the master SCG. Mastership of the SCGs is independent of the host subsystem, so routing functions are not affected.

Power supplies—The router has two power supplies, which share the load evenly. If one power supply fails, the other power supply can provide full power to the router indefinitely.

Cooling system—The cooling system has redundant components, which are controlled by the host subsystem. If one of the fans fails, the host subsystem increases the speed of the remaining fans to provide sufficient cooling for the router indefinitely.

Safety Requirements, Warnings, and Guidelines

Installing and maintaining the router involves working with electrical components. While it is assumed that you have a working knowledge of safety requirements necessary to work with Internet routers, you also need to know the procedures for working safely with and near electrical equipment. A more detailed description of the hazards associated with working with the router is provided in “Prepare the Site” on page 45. However, specific guidelines for working with electrical equipment are beyond the scope of this manual.

For a listing of safety warnings for the router, see “Regulatory Compliance and Safety Information” on page 61.

